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## New Species of *Siparuna* (Monimiaceae) I. Four New Species from Ecuador and Colombia

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**ABSTRACT.** *Siparuna croatii* and *S. palenquensis* from central and Pacific Ecuador, respectively, *S. gigantotepala* from Pacific Colombia and Ecuador, and *S. harlingii* from the eastern Andean slopes of Colombia and Ecuador are described, illustrated, and discussed as to their relationships with morphologically similar species.

Comprising an estimated 150 species, *Siparuna* is the largest and least understood genus of the Monimiaceae. The genus was last revised by Perkins (1901, 1911), whose typological species concept overstates diversity in certain areas, such as planaltan and southeastern Brazil. In Colombia, Ecuador, and Peru, however, increased collecting activity over the past 20 years has turned up numerous new species, and it now appears that most species of *Siparuna* are Andean in distribution. Material in the major relevant herbaria (acronyms following Holmgren et al., 1990), such as AAU, BM, COL, F, G, GB, GH, GOET, K, M, MA, MJG, MO, NY, OXF, P, QCA, QCNE, S, SEL, TCD, UC, US, W, WU, and Z, currently amounts to over 2500 collections representing approximately 100 species from the Andes. Continued discovery of new taxa in upper Amazonia strongly suggests the need for additional collecting. As a result of ongoing work toward a monograph of *Siparuna*, we herein describe four new species in order to make their names available for the forthcoming treatment of the Monimiaceae for the *Flora of Ecuador*. Work on the Peruvian species is still in progress, rendering description of several apparently new species extending south beyond Ecuador inadvisable.

Flowers of *Siparuna* are small and unisexual, and plants are monoecious or dioecious (Perkins, 1901; Feil, 1992). The flowers have an obconical or urceolate floral cup in which the free carpels or stamens are more or less completely enclosed (e.g., Figs. 1A, and 4B and F) and usually minute (1–4 mm) tepals. A feature characteristic of the genus is that the floral apex forms a roof, called a velum, with a central pore through which the upper parts of the stamens or styles protrude (for details of floral

ontogeny and a morphological interpretation of the velum, see Endress, 1980). In the male flowers, the velum is more or less raised at anthesis and the pore is relatively large (Fig. 1A); in the female flowers, the inner margin of the velum is always distinctly raised and the pore is narrower (Fig. 1C).

The stamens are sessile and initiated centripetally, the innermost ones often remaining small or even staminodial. The anthers are two-locular and open around the perimeter of both pollen sacs except at the distal end (Figs. 1B, G, N; 4G; compare also Endress & Hufford, 1989, figs. 97–100). Dehiscence results in a flaplike structure that is hinged distally and bent upward. In fully anthetic male flowers, these flaps usually can be seen with the unaided eye.

Anthesis typically lasts 9–16 days in male flowers and 16–24 days in females (Feil, 1992), and the fertilized flowers then expand. Measurements of floral parts and descriptions of their shape are therefore of limited value. More diagnostically useful are the shape, color, and pubescence of the leaves and the number of stamens and styles.

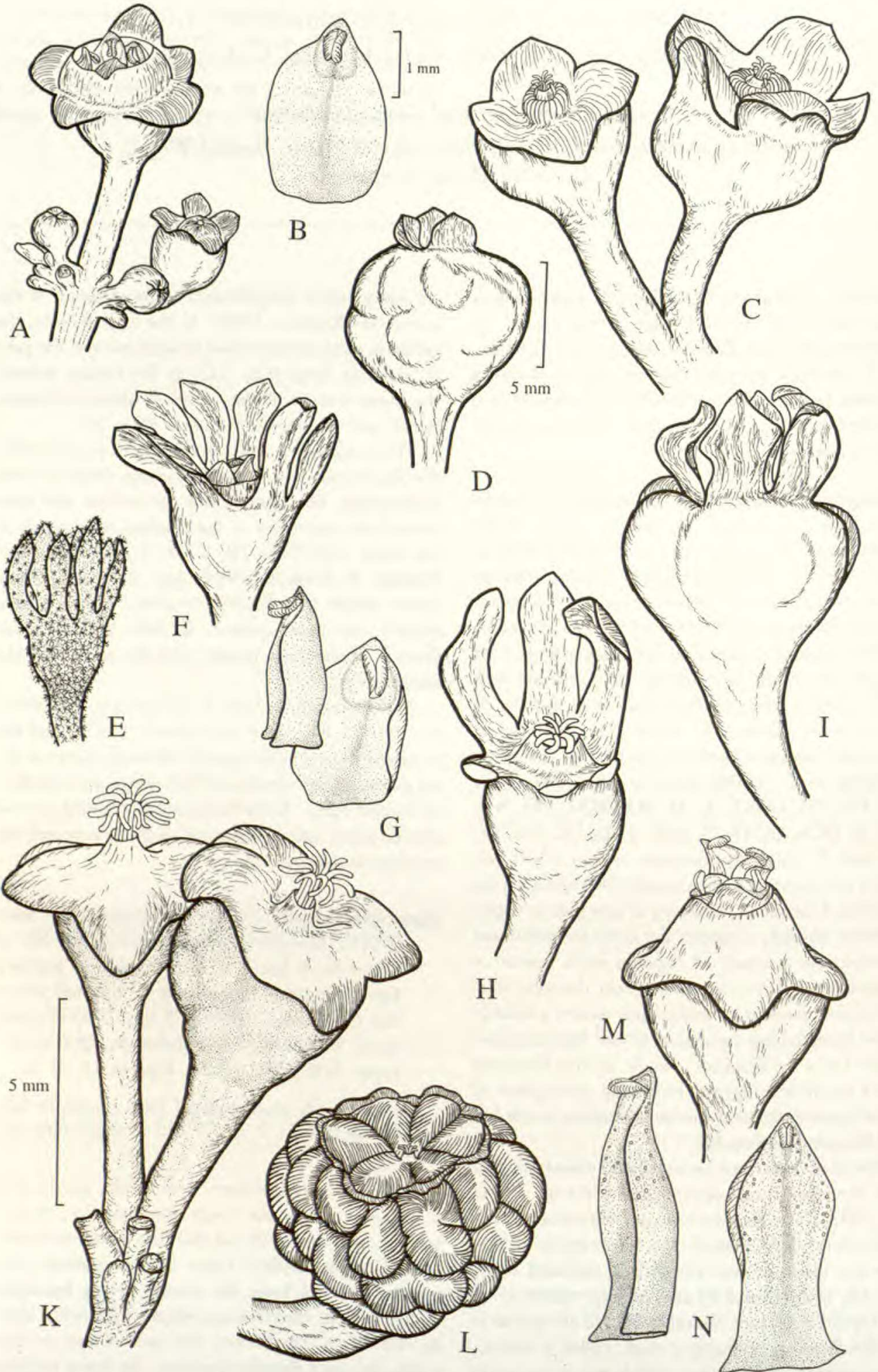
### ***Siparuna croatii* Renner & Hausner, sp. nov.**

**TYPE:** Ecuador. Cotopaxi: 63.4 km SE of Quevedo, 6 km NW of El Corazón, primary forest on steep slopes near a waterfall above Río Angamarca, 1030 m, 4 Apr. 1983 (female, fl), T. B. Croat 55752 (holotype, QCNE; isotypes, AAU, MO, QCA). Figures 1A–D, 2.

Species ramulis quadrangularis valde sulcatis et foliis late ellipticis (18–42 × 10–20 cm) a congeneribus diversa.

Dioecious shrub or tree, 4–5 m tall, partly with a liana-like habit, the twigs quadrangular, deeply sulcate, and khaki-colored due to a dense indumentum of minute stellate hairs. Leaves opposite, the petioles 4–5 cm long; the lamina drying brownish to olive-green, chartaceous, elliptic to broadly elliptic, 18–42 × 10–20 cm, the base obtuse or subacute, the apex shortly apiculate, the lower surface with minute appressed stellate hairs, the upper sur-







face scantily stellate-pubescent to glabrescent and rather smooth, with 22–24 pairs of secondary veins, the secondary and tertiary veins distinctly prominulous and yellow below, the margin inconspicuously denticulate. Cymes of both sexes axillary in groups of 2–4, ample and multiflorous, 3–5 cm long, with minute yellowish khaki stellate hairs. Male flower at anthesis 1.9–2.1 × 1.8–2.1 mm, the floral cup urceolate to globose with minute stellate hairs, the floral roof moderately raised, glabrous and drying dark brown, the 4–5 tepals obtusely triangular and 0.4–0.6 mm long, when fresh greenish; stamens 6, fleshy and containing white globules (large oil cells), the 4 outer ones slightly exerted at anthesis. Female flowers at anthesis of the same size and shape as the males but the floral roof raised to a cylindrical bulge separated by a distinct groove from a second innermost tube sheathing the style bases; the styles 5–7, basally united. Fruit fleshy and red when fresh; mature fruit and seeds unknown.

*Distribution, habitat, and phenology.* Endemic in central Ecuador; growing in primary montane forest on steep slopes and in secondary scrub at elevations of 1000–1400 m; collected flowering and with young fruits in April and May.

*Siparuna croatii* differs from all other species in the genus in its khaki-colored, deeply sulcate, quadrangular branchlets, olive-green leaves with secondary and tertiary veins distinctly raised below, and, for the genus, ample, khaki-colored inflorescences with small flowers.

*Paratype.* ECUADOR. **Manabí:** trail from El Corazón to Facundo Velo, 1–3 km S of El Corazón, 1400 m, 17 May 1980 (male, fl), *Harling & Andersson 19216* (AAU, GB, MJG, QCA).

***Siparuna palenquensis*** Renner & Hausner, sp. nov. TYPE: Ecuador. Pichincha: Hcda. Covadonga on Río Pilatón, 1000 m, 2 July 1955 (male, fl), *E. Asplund 16764* (holotype, S; isotypes, MJG, QCA). Figures 1K–N, 3.

A *Siparuna eggersii* Hieronymus foliis obovatis (16–27 × 10–17 cm) differt.

Dioecious tree, 4–10 m tall, young branchlets densely pubescent with minute stellate hairs, older

branches dark brown and subglabrous, terete. Leaves opposite, the petioles 1.5–4.5 cm long; the lamina drying olive-green or brown, chartaceous, obovate, 16–27 × 10–17 cm, the base cordate, truncate, or rounded, the apex shortly apiculate, both surfaces rather rough and scantily to moderately stellate-pubescent, with 10–13(–16) pairs of secondary veins, veins to the third order impressed above, distinctly visible below, the margin minutely denticulate. Cymes of both sexes axillary in groups of 2–4 and multiflorous (less so in the females), 1.5–4 cm long, and almost glabrous. Male flower at anthesis ca. 5.5–6.3 × 5–5.5 mm, the floral cup obconical with scant stellate hairs, the floral roof strongly raised, glabrous and drying dark brown or black, the 4–5 tepals nearly completely fused, fresh greenish yellow; stamens 6, often with 4 outer and 2 central ones, fleshy and containing white globules (oil cells), the outer stamens distinctly exerted at anthesis. Female flowers at anthesis of the same size and shape as the males; the styles ca. 15–30, basally united. Fruit fleshy, ca. 1.3–2 × 1–2 cm, fresh immature light green with sparse blackish scales, mature yellowish or reddish orange and smelling strongly of lemon; the 15–30 seeds distinctly visible in dried fruits, verrucose, gray, and with a red aril when fresh.

*Distribution, habitat, and phenology.* Restricted to Pacific Ecuador and described by collectors as infrequent or rare; growing in disturbed premontane forests on steep slopes or on cliffs; sea level to 1200 m; collected flowering and fruiting mainly from April to September.

The suggested relative, *Siparuna eggersii* Hieronymus, has smaller, obovate leaves (usually 12–15 × 8–10 cm) with cuneate bases. The two species have previously been confused, as, for example, in the florula of the Río Palenque Biological Station by Dodson & Gentry (1978), which describes and illustrates specimens of *S. palenquensis* as *S. eggersii*.

*Paratypes.* ECUADOR. **Esmeraldas:** NE across Río Blanco from Quinindé, *Little 6230* (F, K, US). **Los Ríos:** Río Palenque Biological Station, *Dodson 5134* (AAU, F, MO, QCA, SEL, US), *Dodson 5723* (MO, QCA, SEL,

Figure 1. A–D. *Siparuna croatii* Renner & Hausner (A, B, *Harling & Andersson 19216*; C, D, *Croat 55752*). —A. Part of male inflorescence. —B. Stamen. —C. Female flowers. —D. Young fruit. E–I. *Siparuna gigantotepala* Renner & Hausner (E, *Barfod et al. 48903*; F, G, *Cuatrecasas 15746*; H, I, *Rubio et al. 999*). —E. Young male flower. —F. Mature male flower. —G. Stamens. —H. Female flower. —I. Young fruit. K–N. *Siparuna palenquensis* Renner & Hausner (K, *Øllgaard 98054*; L, *Jaramillo 44*; M, *Dodson 5134*; N, *Asplund 16764*). —K. Female flowers. —L. Mature fruit. —M. Male flower. —N. Stamens. The following parts share the same magnification: A, C, E, F, H, I, K, M; B, G, N; and D, L.



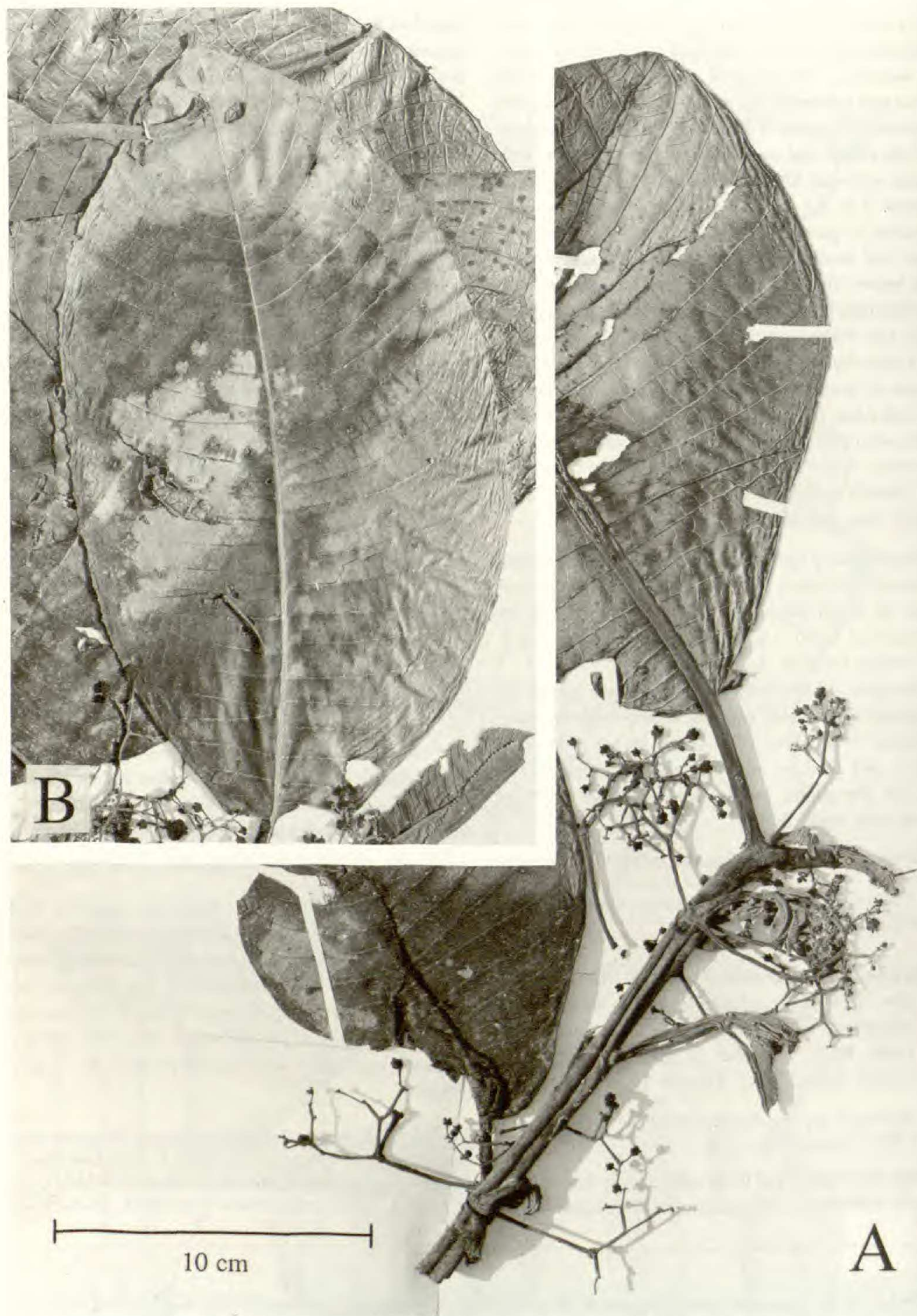


Figure 2. Female specimens of *Siparuna croatii* Renner & Hausner (Croat 55752). —A. AAU isotype. —B. MO isotype.



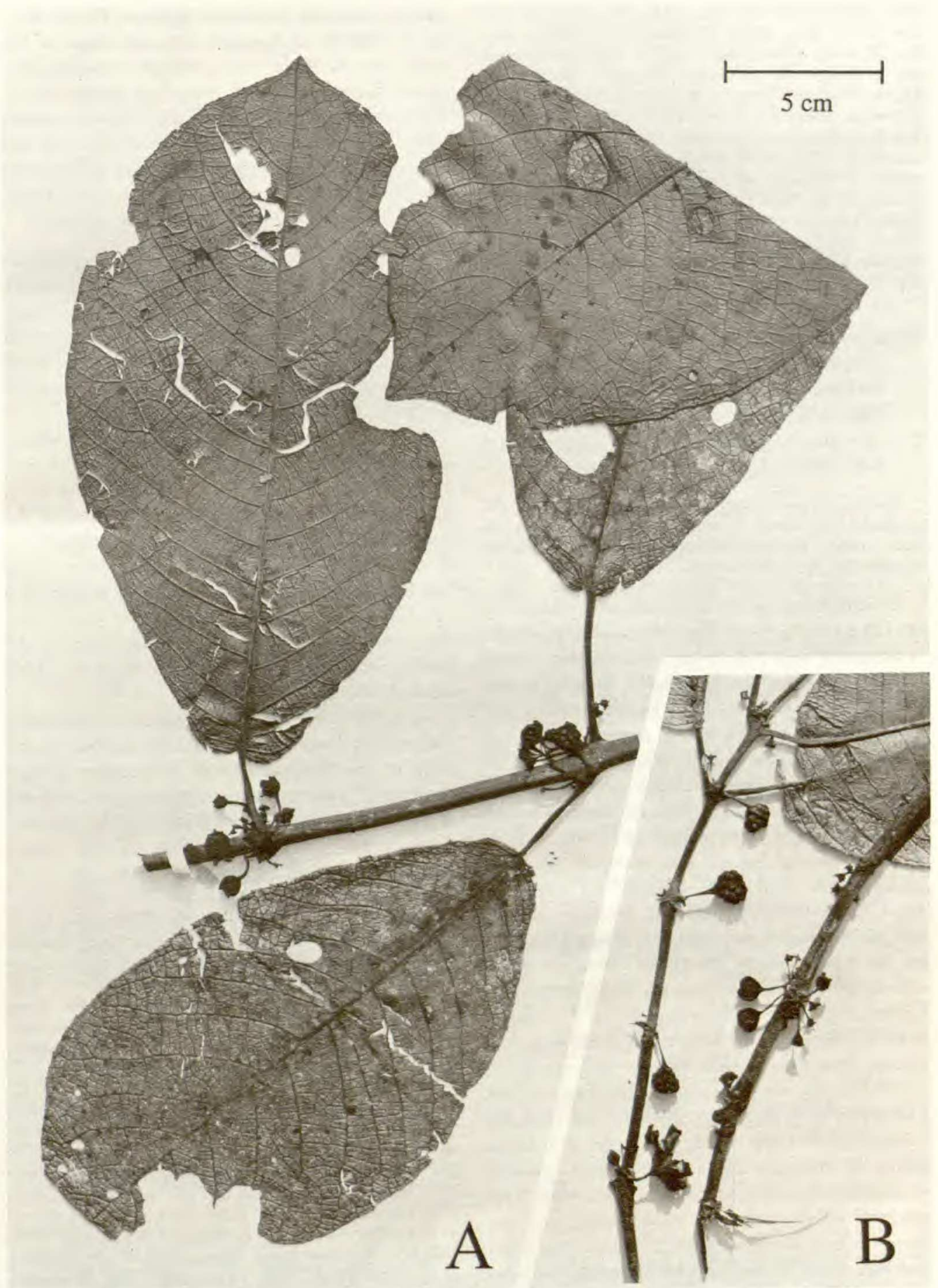


Figure 3. Female specimens of *Siparuna palenquensis* Renner & Hausner. —A. Croat 55702. —B. Øllgaard 98054, AAU, paratype.



US), *Dodson* 5930 (MO, NY, SEL, US), *Gentry & Dodson* 17970 (MO, QCA). **Pichincha:** Pichincha, ca. 8 km SE of La Aurora, km 7 on Sto. Domingo-Quevedo rd., at bridge over Río Baba, *Øllgaard* 98054 (AAU, QCA); Tinalandia, 9.6 km E of Santo Domingo de los Colorados, above Río Toáchi, *Croat* 55702 (AAU, MO); km 3 of Toáchi-Las Pampas rd., *Dodson & Gentry* 13708 (F, MO, QCNE, SEL); old rd. Quito-Santo Domingo, 2-9 km NE of turn-off to old rd. of Alluriquin, *Luteyn et al.* 8736 (AAU, NY, QCA, QCNE); Aloag-Santo Domingo, Toáchi, at the confluence between Río Pilatón and Río Toáchi, *Sparre* 13829 (MJG, S). **Cotopaxi:** island in Río San Pablo, near La Maná, *Webster* 22727 (UC).

***Siparuna harlingii*** Renner & Hausner, sp. nov.

TYPE: Ecuador. Morona-Santiago: 7-8 km N of Gualaquiza on rd. to Indanza, 1500 m, 16 Apr. 1985 (male, fl), *G. Harling & L. Andersson* 24175 (holotype, QCA; isotypes, AAU, GB). Figure 4.

Species *Siparunae asperae* (Ruiz & Pavón) A. DC. proxima, cujus flores foliorumque texturam et colorem habet. Differt floribus fructibusque minus pubescentibus et pedicellis paullo incrassatis.

Dioecious tree or shrub, sometimes scandent, 2-6(-12) m tall, the young and older branchlets densely pubescent with stellate hairs, subangular. Leaves opposite and those of a pair slightly unequal in size, the petioles (2-)2.5-4(-7) cm long; the lamina drying dark green to dark brown, papery, brittle, and subbullate to rather smooth, elliptic to broadly elliptic, sometimes narrowly elliptic, 18-35 × 9-22 cm, the base truncate to cordate, occasionally rounded or acute, the apex acuminate, both surfaces densely stellate-pubescent, glabrescent on the upper surface, with (8-)12-13(-15) pairs of secondary veins, these distinctly visible on the upper surface and slightly raised and yellowish brown pubescent on the lower surface, the tertiary venation dense and distinctly visible, the margin finely denticulate. Cymes of both sexes axillary in groups of 2-4, much-branched (less so in the females), 2-5 cm long, with minute stellate hairs. Male flower at anthesis ca. 4-4.5 × 4-5 mm, the floral cup obconical with minute, pale yellowish stellate hairs, the floral roof distinctly raised, glabrous and drying black, the 4-5 tepals obtuse or triangular and 1-1.5 mm long, glabrous or occasionally with a few stellate hairs, when fresh greenish yellow to creamy white, turning red; stamens 6, often with 4 outer and 2 central ones, fleshy and containing whitish globules (oil cells), the outer

stamens distinctly exerted at anthesis. Female flowers at anthesis of the same size and shape as the males but the floral roof centrally conspicuously raised; the styles 20-30, free. Fruit fleshy, 1.5 × 1.5 cm (when fresh to 2 cm diam.), when immature green with pink spots, when mature light red and with a strong lemon smell when crushed, glabrescent; the 20-30 seeds distinctly visible in dried fruits, verrucose, gray and with a red aril when fresh.

*Distribution, habitat, and phenology.* On the eastern Andean slopes from Putumayo and Caquetá in Colombia to Napo, Pastaza, Morona-Santiago, and Zamora-Chinchipe in Ecuador (and expected in Loja); usually collected in disturbed terra firme forest from 300 to 2000 m altitude; in Ecuador flowering and fruiting year-round.

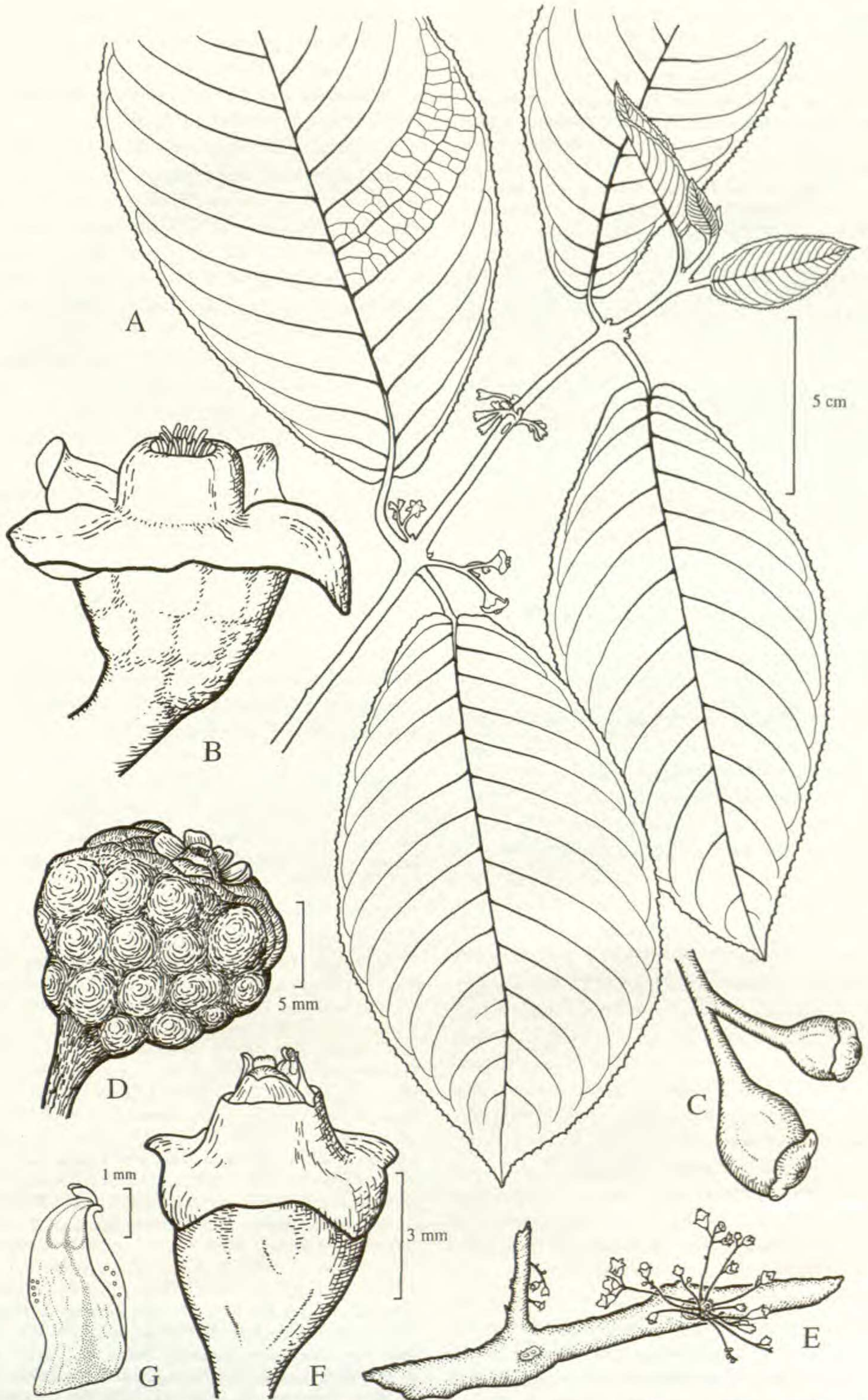
*Siparuna harlingii* can only be confused with *S. aspera* from which it differs especially in the fruit and pedicels, which in fruit remain slender in *S. harlingii* and become fleshy and almost part of the fruit in *S. aspera*. The two also differ in pubescence, *S. harlingii* having generally much shorter hairs, and in the leaf venation, *S. harlingii* having (8-)12-13(-15) lateral nerves, *S. aspera* (15-)16-20(-26). Finally, the two may be distinguished by the number of styles (20-30 in *S. harlingii* vs. (10-)12-15(-18) in *S. aspera*).

As is the case with several species of *Siparuna*, the crushed leaves of this plant are rubbed on the body by the Quichua Indians in Ecuador to cure "mal aire," a general term used for various diseases of the nervous system and stomach. The Quichua name of the species is "Malaire panga," panga meaning leaf (*Neill & Palacios* 6993).

*Paratypes.* ECUADOR. **Zamora-Chinchipe:** horse-trail Guadalupe-San José de Yacuambi, along Río Yacuambi, potreros and riverside woods, *Harling & Andersson* 13937 (AAU, GB). **Tungurahua:** between Baños and Río Verde, *Acosta-Solís* 10267 (F); Río Topo, *Harling et al.* 10073 (AAU, GB); 30 km on rd. from Mera towards Baños, *Lawesson et al.* 43293 (AAU, QCA); Río Margaritas, *Penland & Summers* 141 (F, GH, NY). **Napo:** Tena, *Asplund* 8938 (QCA, S); Tena, rd. to Archidona, *Harling* 3660 (S); Mission Shandia, Jatun Yaku River, *Barclay* 4932 (COL); Puerto Napo, *Bénoist* 4757 (P); Puerto Napo, path to Latas, *Harling* 3537 (S), *Cerón & Iguago* 5518 (AAU, QCNE); 8 km downriver from Misahuallí, *Neill & Palacios* 6993 (AAU, F, MO, QCNE); km 32-35 Puyo-Tena rd., *Jørgensen et al.* 61248 (AAU, QCA); Zatzayacu, *Mexía* 7097 (NY, UC, US). **Pastaza:** Mera, *Asplund* 18357 (S), *Harling et al.* 7807 (AAU, GB), 7840 (AAU, GB). **Morona-**

Figure 4. *Siparuna harlingii* Renner & Hausner (A, *Harling* 928; B, *Cuatrecasas* 11167; C, *Harling & Andersson* 13937; D, *Neill & Palacios* 6993; E-G, *Harling & Andersson* 13917). —A. Habit. —B. Female flower. —C.





Young fruits. —D. Mature fruit. —E. Male inflorescence. —F. Male flower. —G. Stamen. The following parts share the same magnification: A, E; B, F; and C, D.



**Santiago:** rd. Limón-Macas, 96 km NE of Limón, *Bohlin et al.* 1477 (GB, QCA); near Méndez, *Camp E-851* (NY, S), *Harling* 928 (S); Méndez-Limón rd., ca. 3.2 km S of turnoff to Méndez, *Dorr & Valdespino* 6345 (AAU, NY, QCA, QCNE); Río Tutanangosa, rd. Sucúa-Huarani, *Holm-Nielsen* 20508 (AAU). **Zamora-Chinchi:** rd. Zamora-Zumba, km 5-12, *Harling & Andersson* 13917 (AAU, GB); 10 km S of Zamora on rd. along left shore of Río Jamboé, *Harling & Andersson* 24014 (AAU, GB, QCA); rd. La Saquea-Yacuambi, 1 km N of Chapintza, *Harling & Andersson* 23893 (AAU, GB, QCA); Zamora, *Harling* 5930 (NY, S), *Knight* 713 (S); Cumaratza, *Jaramillo & Winnerskjold* 5922 (NY, QCA). **COLOMBIA. Putumayo:** Río Guamués, San Antonio del Guamués, *Cuatrecasas* 11167 (F, US); Mocoa, *Cuatrecasas* 11278 (F, US), *Schultes* 2031 (F, K, US), *Schultes & Cabrera* 19064 (US); Río Mocoa drainage at San Antonio, *Ewan* 16704 (US); Puerto Umbria, *Klug* 1764 (BM, F, K, MO, NY, S, US); near Río Putumayo, *Soejarto et al.* 1277 (US). **Caquetá:** 62 km SE of Guadalupe, along rd. to Florencia, *Davidse et al.* 5633 (COL, NY).

***Siparuna gigantotepala*** Renner & Hausner, sp. nov. TYPE: Ecuador. Carchi: San Marcos valley, 600 m, 20 Nov. 1983 (male, fl), *A. Barfod*, *L. P. Kvist & D. Nissen* 48903 (holotype, QCA; isotype, AAU). Figures 1E-I, 5.

*Siparuna subscandens* A. C. Smith tepalis longe acutatis (2-3 mm) conspicuis distinguenda.

Dioecious shrub or treelet, 2-3(-5) m tall, branchlets densely covered with minute sessile stellate hairs, quadrangular and slightly sulcate. Leaves opposite, the petioles 2.5-4.5 cm long; the lamina drying umber, chartaceous, obovate, 18.5-33 × 8.5-14 cm, the base cuneate to acute, the apex cuspidate with the tip (1-)1.5-2(-3) cm long, both surfaces densely covered with minute stellate hairs, with 9-10(-13) pairs of secondary veins, veins to the third order slightly raised above and distinctly raised below, the margin doubly serrate or subentire. Cymes of both sexes axillary in pairs and multiflorous (less so in the females), 1.5-5(-9) cm long, densely covered with minute stellate hairs. Male flower at anthesis ca. 2.8-3.2 × 2.5-3 mm, the floral cup obconic with stellate sessile hairs, a few of these also on the inside of the tepals and the floral roof, the floral roof distinctly raised, the (4-)5-6 tepals oblong and 2-3 mm long, when fresh greenish cream or white; stamens 4-5(-6), the outer ones somewhat exserted at anthesis. Female flowers at anthesis of the same size and shape as the males but the velum distinctly raised to a central tube surrounding the style bases; the styles 5-8, free. Fruit fleshy, ca. 1.3-2 × 1-2 cm, subglobose and crowned by the persistent tepals, when mature red or purple with whitish spots and strongly lemon-scented; the ca. 5-8 seeds verrucose, gray and with a red aril when fresh.

*Distribution, habitat, and phenology.* Collected in very humid primary pluvial forests in Pacific Colombia and Ecuador at elevations of 20-1500 m; in Esmeraldas and Carchi collected flowering and fruiting from November to April.

*Siparuna gigantotepala* differs from all other Andean species in the elongate, oblong tepals that persist in fruit. A few specimens of *S. gigantotepala* (e.g., *Forero et al.* 6740) possess small domatia at the leaf bases. In this they resemble the western Ecuadorean *S. eggersii* Hieronymus, the western Colombian *S. subscandens* A. C. Smith, and the Panamanian *S. domatiata* A. H. Gentry. All three differ from *S. gigantotepala* in lacking elongate tepals. *Siparuna eggersii* also has smaller, paler green-drying leaves that lack the pronounced drip tip of *S. gigantotepala*, *S. subscandens* has narrower leaves, and *S. domatiata* has much larger domatia (as far as known) than *S. gigantotepala*. There is one Amazonian species, *S. macrotepala* Perkins, which has similarly conspicuous tepals. It differs in pubescence (simple hairs in *S. macrotepala* vs. stellate hairs in *S. gigantotepala*), number of secondary veins in the leaves (5-6(-8) in the first vs. 9-10(-13) in the second), and number of styles (9-12 in the first vs. 5-8 in the second). Moreover, *S. gigantotepala* has free styles, while those of *S. macrotepala* are united into a tube.

The Coaiquer (Awá) Indians inhale the penetrating smell of the fruits and leaves of *S. gigantotepala* to clear the nasal passages (*A. Barfod et al.* 48903). The local names "Limón de monte" or "Diablo de monte limón" also refer to the strong smell of the fruits.

*Paratypes.* **ECUADOR. Esmeraldas:** Eloy Alfaro, Reserva Cotacachi-Cayapas, Parroquia Luis Vargas Torres, Río Santiago, *Tirado et al.* 804 (QCNE); trail to Río Mataje Awá encampment from Río Palaví, *Hoover et al.* 4007 (AAU, MO, QCA); Reserva Awá, 25 km NW of El Chical, Municipio Maldonado, *Rubio et al.* 999 (AAU, MO, QCNE), *Rubio et al.* 1036 (AAU, MJG, MO, QCNE); Reserva Awá, Mataje, *Jørgensen et al.* 65316 (AAU, QCA), *Rubio & Quelal* 1356 (AAU, MJG, MO, QCNE). **Carchi:** Reserva Forestal Awá, trail Gualpi bajo-Tarabita, *Jørgensen et al.* 65232 (AAU, QCA); Gualpi Chico, Awá encampment, *Hoover et al.* 2602 (AAU, MO, QCA); Reserva Awá, Centro San Marcos, *Méndez et al.* 162 (QCNE); wet plateau above San Marcos de los Coaiqueres, *Øllgaard et al.* 57274 (AAU, QCA), *Øllgaard et al.* 57584 (AAU, QCA). **COLOMBIA. Chocó:** Quibdó-Tutunendo rd., 14 km E of Quibdó, *Gentry & Rentería* 24139 (MO); San José de Palmar, hoyo del Río Torito, finca Los Guadales, quebrada Santa Fe, *Forero et al.* 6740 (MO). **Valle:** Río Naya, Puerto Merizaldo, Costa Pacífica, *Cuatrecasas* 13964 (F, US); Río Yurumanguí, *Cuatrecasas* 15746 (F, US); Río Calima, ca. 10 km N Buenaventura, *Gentry* 35263 (COL, MO). **Nariño:** Municipio de Tumaco, *Mora* 4212 (COL).



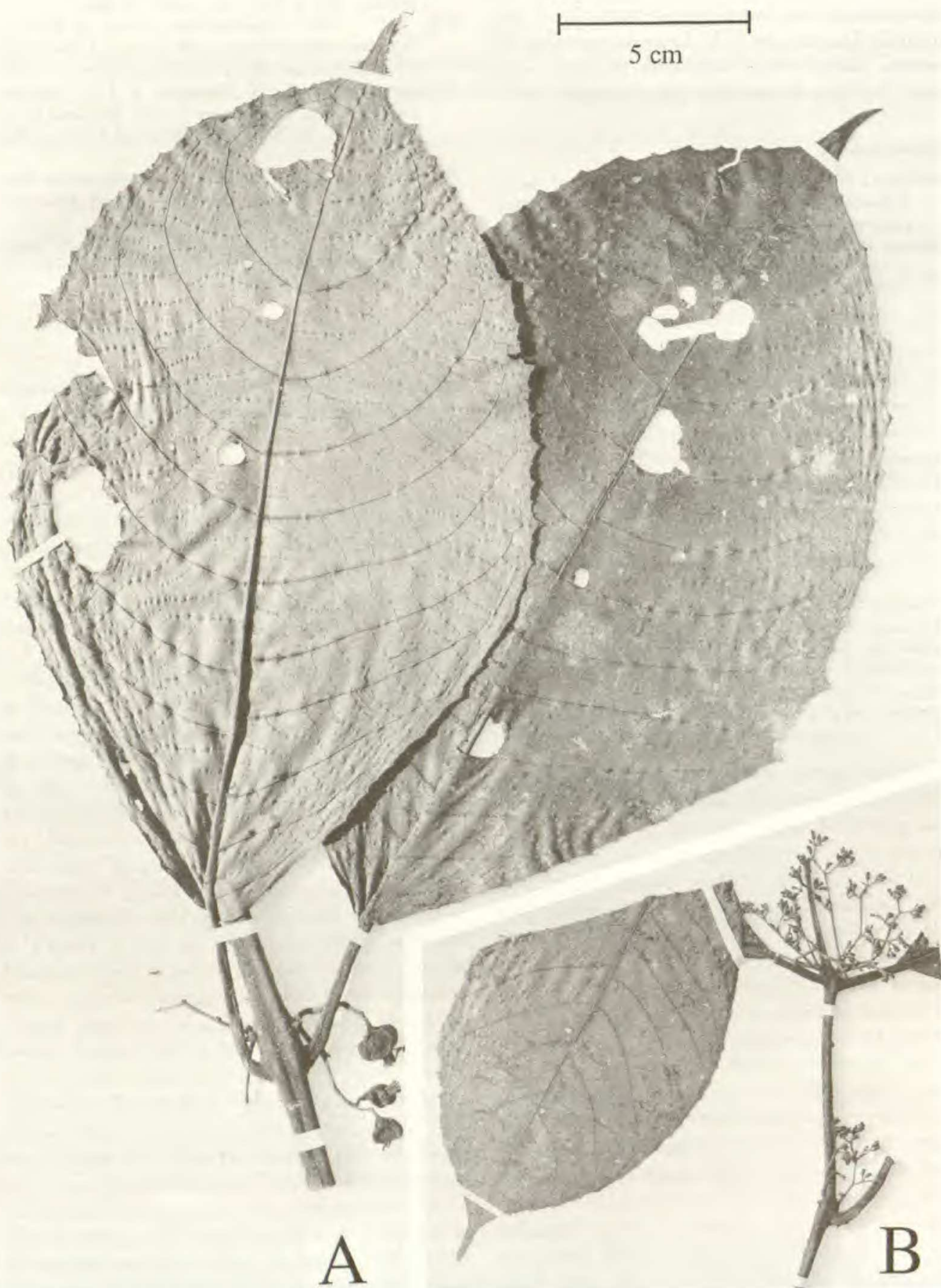


Figure 5. Female specimens of *Siparuna gigantotepala* Renner & Hausner. —A. *Ølgaard et al.* 57274. —B. *Barfod et al.* 48903, AAU isotype.



*Acknowledgments.* We thank A. Berg and A. Horn for help with the illustrations, D. Neill for information on the whereabouts of duplicates in Quito, and D. Lorence and P. M. Jørgensen for insightful reviews. Dan Nicolson went over the Latin diagnoses; his input is gratefully acknowledged.

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